WE CLAIM:

1. A method of selecting chemical grade silicon metalloid having improved performance in the direct process for making organohalosilanes, in which an organohalide is reacted with silicon metalloid in the presence of a copper catalyst at an elevated temperature, the method comprising:
(A) measuring the temperature of a batch of silicon metalloid during both the refining and the casting of the silicon metalloid; (B) measuring the elemental impurity levels in the batch of the silicon metalloid; (C) predicting the properties of slag produced during refining of the silicon metalloid based on equilibrium calculations using the elemental impurity levels and the measured temperatures of the batch of silicon metalloid; and (D) selecting a chemical grade silicon metalloid for use in the direct process for making organohalosilanes based upon the predicted slag properties; such that the slag density, the viscosity, and the melting point of the slag are within acceptable and predetermined ranges for the batch.

2. A method according to Claim 1 in which the organohalosilanes include dimethyldichlorosilane and the chemical grade silicon metalloid is selected to favor the production yield of dimethyldichlorosilane.

3. A method according to Claim 1 in which the predicted melting point of the slag is lower than the temperature during refining of the batch of chemical grade silicon.

4. A method according to Claim 1 in which the predicted slag density is at least 0.02 gram per cm^3 higher than the density of the batch of chemical grade silicon at the casting temperature.

5. A method according to Claim 1 in which the predicted slag density is at least 0.04 gram per cm^3 higher than the density of the batch of chemical grade silicon at the casting temperature.

6. A method according to Claim 1 in which the predicted slag viscosity is at least 35 poise at the casting temperature.

7. A method according to Claim 1 in which the predicted slag viscosity is at least 40 poise at the casting temperature.

8. A method according to Claim 1 in which the predicted slag viscosity is at least 50 poise at the casting temperature.

9. A method according to Claim 1 in which (i) the predicted melting point of the slag is lower than the temperature during refining of the batch of chemical grade silicon; (ii) the predicted slag density is at least 0.02 gram per cm^3 higher than the density of the batch of chemical grade silicon at the casting temperature; and (iii) the predicted slag viscosity is at least 35 poise at the casting temperature.

10. A method of production of silicon, in which quartz (SiO_2) is carbothermally reduced in an electric arc furnace, refined, and cast, the method comprising
(A) controlling the temperature of silicon during both the refining and the casting of the silicon; (B) controlling the elemental impurity levels in the silicon after refining of the silicon;
(C) predicting the properties of slag produced during refining of the silicon based on equilibrium calculations, using the elemental impurity levels and the measured temperature of the silicon; and (D) selecting the silicon for use in the direct process based upon the predicted slag properties; such that the slag density, the slag viscosity, and the melting point of the slag are within acceptable and predetermined ranges.

11. A method according to Claim 10 in which the predicted melting point of the slag is lower than the temperature during refining of the batch of chemical grade silicon.

12. A method according to Claim 10 in which the predicted slag density is more than 0.02 gram per cm^3 higher than the density of the batch of chemical grade silicon at the casting temperature.

13. A method according to Claim 10 in which the predicted slag density is more than 0.04 gram per cm^3 higher than the density of the batch of chemical grade silicon at the casting temperature.

14. A method according to Claim 10 in which the predicted slag viscosity is at least 35 poise at the casting temperature.

15. A method according to Claim 10 in which the predicted slag viscosity is at least 40 poise at the casting temperature.

16. A method according to Claim 10 in which the predicted slag viscosity is at least 50 poise at the casting temperature.

17. A method according to Claim 10 in which (i) the predicted melting point of the slag is lower than the temperature during refining of the silicon; (ii) the predicted slag density is at least 0.02 gram per cm^3 higher than the density of silicon at the casting temperature; and (iii) the predicted slag viscosity is at least 35 poise at the casting temperature.